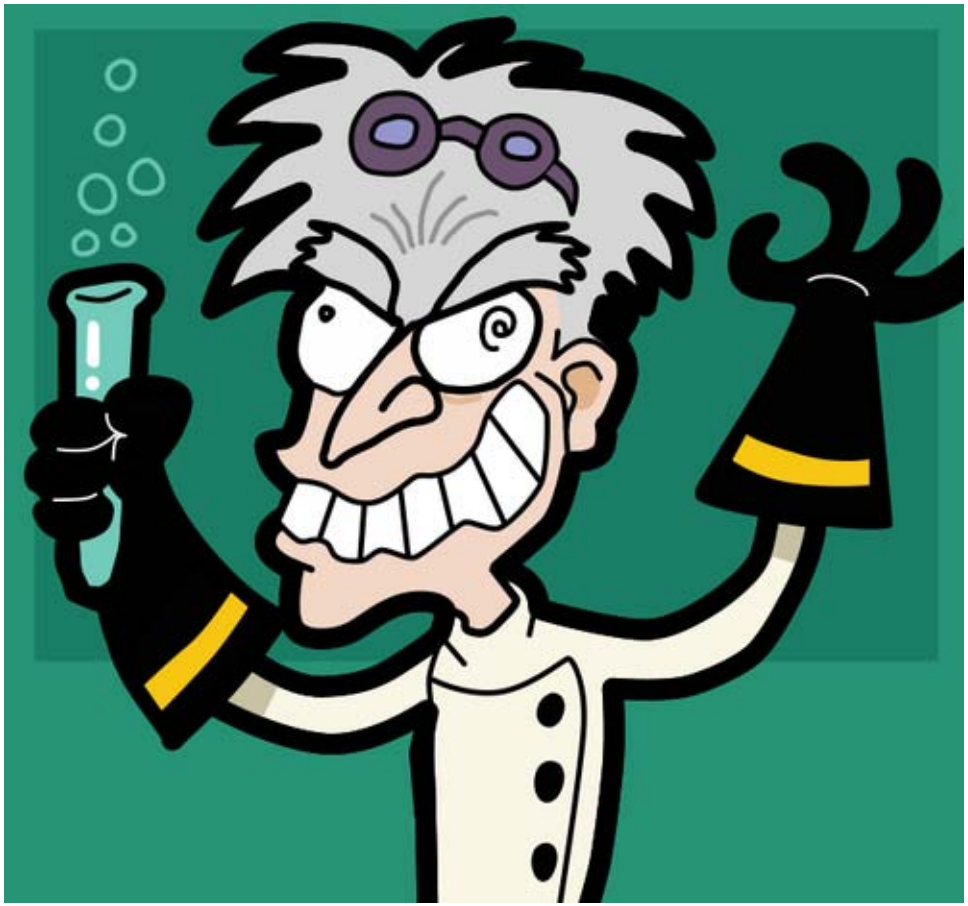
Stoichiometry



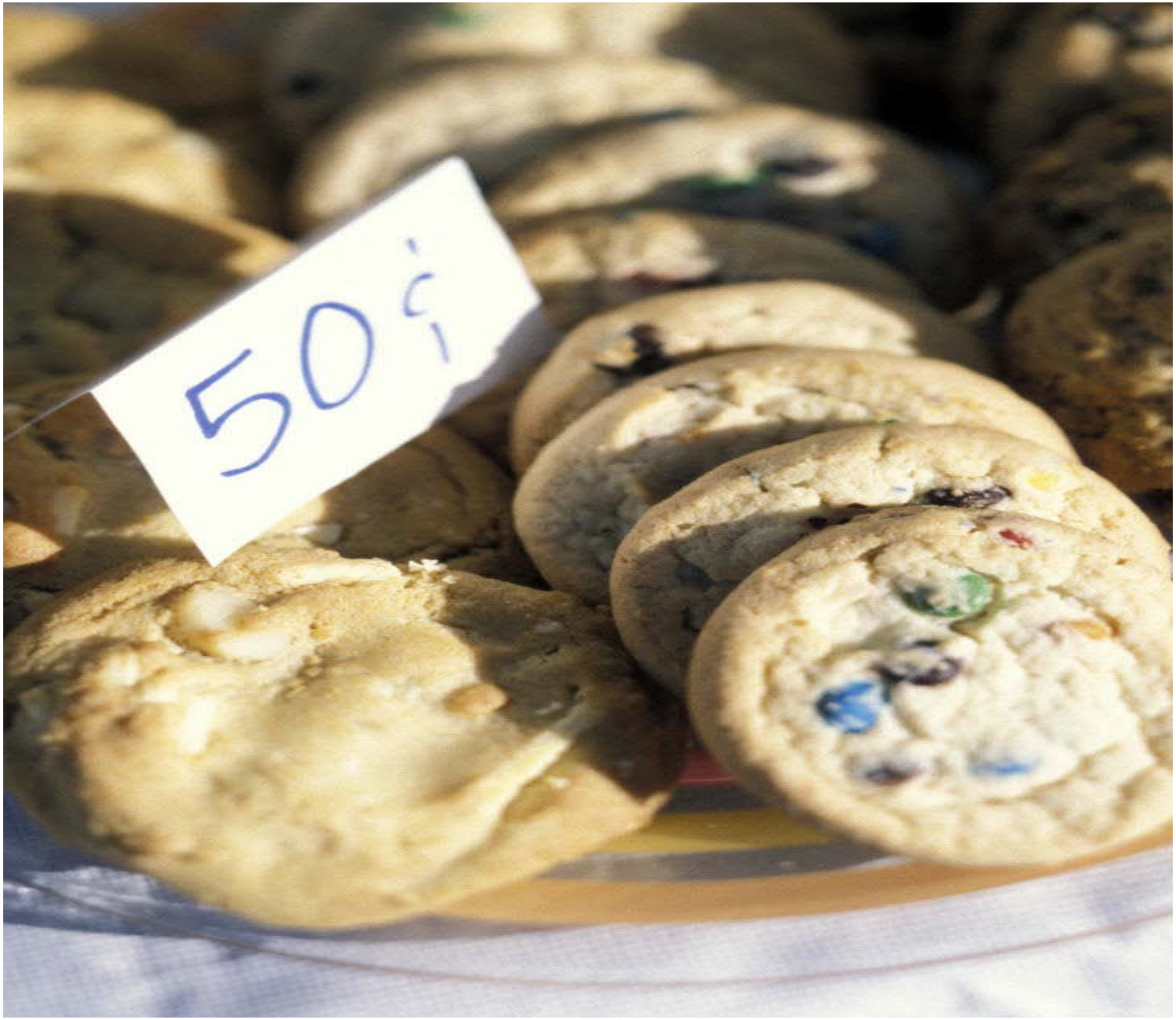
A Recipe

- The recipe for chocolate chip cookies is:
  - 2 ¼ cups of flour
  - ¾ cup of refined sugar
  - ¾ cup of brown sugar
  - 1 cup butter
  - 1 tsp salt (sodium chloride)
  - 1 tsp baking soda (sodium hydrogen carbonate)
  - 1 tsp vanilla extract
  - 2 eggs
  - 1 12-oz package of semisweet chocolate chips

C is for cookie

- This will make about 48 cookies.

- In chemistry to make a compound, the same idea applies.
- You need a recipe to make a chemical.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Stoichiometry defined

- the determination of the proportions in which chemical elements and/or compounds combine or are produced and the weight relations in any chemical reaction

Chemical recipes

- Take the balanced equation:

$$2H_2 + O_2 \rightarrow 2H_2O$$

Chemical recipes

- The recipe is:
  - 2 moles of hydrogen combined with 1 mole of oxygen will make 2 moles of water

stoichiometry

This is what we do in stoichiometry.

We use the balanced equation as the recipe and what is given in the problem to figure out what we need to make a given amount of a compound.

Steps for solving

- 1.convert the mass or volume given in the problem to moles
- 2. set up a ratio with the info from the equation and what you have calculated
- 3. convert this # of moles to the required units.

Examples

How many grams of calcium oxide can be prepared from 500 g of calcium carbonate?

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

Examples

How many liters(@STP) of oxygen are required to oxidize 100.0 g of aluminum?

$$4\ Al + 3\ O_2 \longrightarrow 2\ Al_2O_3$$

Examples

What volume of O_2 is needed to completely combust 0.05 L CH_4 to produce CO_2?

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

DONE